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Tree Farm Licence 45

Issued to International Forest Products Ltd.

Rationale for Allowable Annual Cut (AAC) Determination

Effective November 1, 2001

Ken Baker
Deputy Chief Forester

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Objective of this Document

This document is intended to provide an accounting of the factors I have considered and the rationale I have employed in making my determination, under Section 8 of the *Forest Act*, of the allowable annual cut (AAC) for Tree Farm Licence (TFL) 45. This document also identifies where new or better information is needed for incorporation in future determinations.

Description of the TFL

TFL 45, held by International Forest Products Limited (Interfor), consists of 7 separate areas located north of the community of Campbell River, in the Knight Inlet and Phillips Arm areas. It is located within the Vancouver Forest Region, and is administered from the British Columbia Forest Service (BCFS) Port McNeill and Campbell River Forest District offices.

The total land base for TFL 45 is 231 866 hectares, of which 64 918 hectares (about 28 percent) are covered by productive forest. The other 166 948 hectares (72 percent) are composed largely of alpine tundra, non-productive areas, icefields, and rock. In the base case of the timber supply analysis, 25 878 hectares (40 percent) of the total productive land base were estimated to be available for timber harvesting in the long term. In summary, about 11 percent of the total TFL 45 area contributes to the long term timber harvesting land base assumed in the analysis.

The majority of the operable forest area lies within the Coastal Western Hemlock biogeoclimatic zone, with a smaller portion in the higher elevation Mountain Hemlock zone. Major tree species in the timber harvesting land base, in order of proportion, are western hemlock, Douglas-fir, western redcedar, and amabilis fir. Minor tree species in the timber harvesting land base include Sitka spruce, mountain hemlock, yellow-cedar, subalpine fir and shore pine.

History of the AAC

In 1982, TFLs 17 and 36 were amalgamated to form TFL 45. When TFL 45 was issued to British Columbia Forest Products Limited (BCFP) in 1983, the AAC was set at 305 000 cubic metres.

Between 1988 and 1989, 10 percent (28 776 cubic metres) of the Crown AAC available to the licensee was allocated to the Small Business Forest Enterprise Program (SBFEP) due to a share transfer and related provisions of the *Forest Act*. (The share transfer was from BCFP to Fletcher Challenge Canada Limited [FCC]).

In 1991, the chief forester reduced the AAC to 210 000 cubic metres. This volume was allocated entirely to the licensee because a portion of the TFL was deleted in order to move the SBFEP into the adjacent timber supply area.

As a result of the transfer of the TFL from FCC to Interfor in 1991, 5 percent (10 080 cubic metres) of the AAC was reallocated to the SBFEP. The current AAC for TFL 45 is 220 000 cubic metres, which now includes a SBFEP entitlement.

New AAC Determination

Effective November 1, 2001, the new AAC for TFL 45 will be 220 000 cubic metres, unchanged from the current AAC. This AAC includes the volume that may be harvested from both Schedule A and B land, and the SBFEP.

This AAC will remain in effect until a new AAC is determined, which must take place within five years of this determination.

Information Sources Used in the AAC Determination

Information considered in determining the AAC for TFL 45 include the following:

- *Timber Supply Analysis Information Package for Tree Farm Licence 45*, Management Plan No. 4, International Forest Products Limited, submitted May 2, 2001, accepted September 28, 2001;
- Existing stand yield tables for TFL 45, approved by Ministry of Sustainable Resource Management (MSRM), Forest Inventory and Monitoring Branch submitted May 15, 2001, accepted July 18, 2001;
- Managed stand yield tables and site index curves, submitted May 15, 2001, approved by BCFS Research Branch, May 22, 2001;
- *Timber Supply Analysis Report for Tree Farm Licence 45*, Management Plan No. 4, `International Forest Products Limited, submitted June 28, 2001, accepted September 28, 2001;
- *Draft Management Plan No. 4: Tree Farm Licence 45*, International Forest Products Limited, submitted February 14, 2001;
- *Proposed Management Plan No. 4: Tree Farm Licence 45*, International Forest Products Limited, submitted July 17, 2001;
- *TFL 45, Twenty-Year Plan*, International Forest Products Limited, submitted July 17, 2001;
- Summary of public input solicited by the licensee regarding the contents of proposed Management Plan No. 4;
- *Landscape Unit Planning Guide*, Province of British Columbia, March 1999;
- *Higher Level Plans: Policy and Procedures*, BCFS and Ministry of Environment, Lands and Parks (MELP), December 1996;
- Letter from the Minister of Forests to the chief forester, dated July 28, 1994, stating the Crown's economic and social objectives;
- Memorandum from the Minister of Forests to the chief forester, dated February 26, 1996, stating the Crown's economic and social objectives regarding visual resources;
- Letter from the Deputy Ministers of Forests, and Environment, Lands and Parks, dated August 25, 1997, conveying government's objectives regarding the achievement of acceptable impacts of biodiversity management on timber supply;

- Memorandum from the Director of the Timber Supply Branch of the BCFS, dated December 1, 1997, titled *Incorporating Biodiversity and Landscape Units in the Timber Supply Review*;
- *Forest Practices Code of British Columbia Act*, consolidated to March 2001;
- *Forest Practices Code of British Columbia Act Regulations* and *Amendments*, current as of March 2001;
- Forest Practices Code of British Columbia Guidebooks, BCFS and MELP;
- Technical information provided through correspondence and communication among staff from the BCFS and MSRM;
- *Natural and Managed Stand Yield Tables for Tree Farm Licence 45.* J.S. Thrower & Associates Ltd. May 2001;
- *TFL 45 Inventory Audit and Statistical Adjustment.* J.S. Thrower & Associates Ltd. April 2001;
- *Central Coast Land and Coastal Resources Management Plan* (CCLCRMP). Draft March 31, 2001;
- Technical review and evaluation of current operating conditions on TFL 45 through comprehensive discussions with BCFS and MELP staff, notably at the AAC determination meeting held in Nanaimo on July 19, 2001.

Role and Limitations of the Technical Information Used

Section 8 of the *Forest Act* requires the chief forester to consider biophysical as well as social and economic information in AAC determinations. A timber supply analysis, and the inventory and growth and yield data used as inputs to the analysis, typically form the major body of technical information used in AAC determinations. Timber supply analyses and associated inventory information are concerned primarily with biophysical factors—such as the rate of timber growth and definition of the land base considered available for timber harvesting—and with management practices.

However, the analytical techniques used to assess timber supply are necessarily simplifications of the real world. There is uncertainty about many of the factors used as inputs to timber supply analysis due in part to variations in physical, biological and social conditions, although ongoing science-based improvements in the understanding of ecological dynamics will help reduce some of this uncertainty.

Furthermore, technical analytical methods such as computer models cannot incorporate all of the social, cultural and economic factors that are relevant when making forest management decisions. Therefore, technical information and analysis do not necessarily provide complete answers or solutions to forest management problems such as AAC determinations. The information does, however, provide valuable insight into potential impacts of different resource-use assumptions and actions, and thus forms an important component of the information required to be considered in AAC determinations.

In determining the AAC for TFL 45, I have considered known limitations of the technical information provided, and I am satisfied that the information provides a suitable basis for my determination.

Statutory Framework

Section 8 of the *Forest Act* requires the chief forester to consider particular factors in determining AACs for TSAs and TFLs. Section 8 is reproduced in full as Appendix 1.

In accordance with Section 23(3) of the *Interpretation Act*, the deputy chief forester is expressly authorized to carry out the functions of the chief forester which include those required under Section 8 of the *Forest Act*.

The chief forester has expressed the importance of consistency of judgement in making AAC determinations. I also recognize the need for consistency of approach. I have observed the chief forester during a number of previous AAC determinations and am familiar with the guiding principles that the chief forester has employed in making AAC determinations. I find these principles to be reasonable and appropriate and I have employed them as described below in making my AAC determination for TFL 45.

Guiding Principles for AAC Determinations

Rapid changes in social values and in our understanding and management of complex forest ecosystems mean that there is always some uncertainty in the information used in AAC determinations. When a large number of determinations are made for many forest management units over extended periods of time, administrative fairness requires a reasonable degree of consistency of approach in incorporating these changes and uncertainty. To make his approach in these matters explicit, the chief forester has compiled a set of guiding principles for AAC determinations. I have reviewed these principles and find them to be reasonable, and thus I have adopted and applied them as deputy chief forester in AAC determinations for TFLs. These principles are set out below. If in some specific circumstance it may be necessary to deviate from these principles, I will provide a detailed reasoning in the considerations that follow.

Two important ways of dealing with uncertainty are:

(i) minimizing risk, in respect of which in making AAC determinations, I consider the uncertainty associated with the information before me, and attempt to assess the various potential current and future social, economic and environmental risks associated with a range of possible AACs; and

(ii) redetermining AACs frequently, to ensure they incorporate current information and knowledge, a principle that has been recognized in the legislated requirement to redetermine AACs every five years. The adoption of this principle is central to many of the guiding principles that follow.

In considering the various factors that Section 8 of the *Forest Act* requires the chief forester to take into account in determining AACs, I attempt to reflect as closely as possible operability and forest management factors that are a reasonable extrapolation from current practices. It is not appropriate to base my decision on unsupported

speculation with respect either to factors that could work to increase the timber supply—such as optimistic assumptions about harvesting in unconventional areas, or using unconventional technology, that are not substantiated by demonstrated performance—or to factors that could work to reduce the timber supply, such as integrated resource management objectives beyond those articulated in current planning guidelines or the *Forest Practices Code of British Columbia Act* and its associated regulations (the Forest Practices Code).

The *Forest Practices Code of British Columbia Regulations* were approved by the Lieutenant Governor in Council on April 12, 1995, and released to the public at that time. The *Forest Practices Code of British Columbia Act* was brought into force on June 15, 1995.

Although implementation of the Forest Practices Code has been underway since the end of the transition period on June 15, 1997, the timber supply implications of some of its provisions, such as those for landscape-level biodiversity, still remain uncertain, particularly when considered in combination with other factors. In each AAC determination the chief forester takes this uncertainty into account to the extent possible in the context of the best available information. In making my determination for TFL 45, as deputy chief forester, I have followed the same approach.

As British Columbia progresses toward completion of strategic land use plans, the eventual timber supply impacts associated with the land-use decisions resulting from the various planning processes—including the Commission on Resources and Environment (CORE) process for regional plans, the Protected Areas Strategy (PAS) and the Land and Resource Management Planning (LRMP) process—are often discussed in relation to current AAC determinations. Since the outcomes of these planning processes are subject to significant uncertainty before formal approval by government, it has been and continues to be the position of the chief forester that in determining AACs it would be inappropriate to attempt to speculate on the timber supply impacts that will eventually result from land-use decisions that have not yet been taken by government. I consider this approach to be reasonable and appropriate. Like the chief forester, therefore, I will not take into account the possible impacts of existing or anticipated recommendations made by such planning processes, nor attempt to anticipate any action the government could take in response to such recommendations.

Moreover, even where government has made a formal land-use decision, it may not always be possible to fully analyze and account for the consequent timber supply impact in a current AAC determination. In many cases, government's land-use decision must be followed by a number of detailed implementation decisions. For example, a land-use decision may require the establishment of resource management zones and resource management objectives and strategies for these zones. Until such implementation decisions are made it would be impossible to fully assess the overall impacts of the land-use decision. Nevertheless, the legislated requirement for five-year AAC reviews will ensure that future determinations address ongoing plan implementation decisions.

However, where specific protected areas have been designated by legislation or by order in council, these areas are no longer considered to contribute to the timber supply in AAC determinations.

For the area of TFL 45, the Central Coast Land and Coastal Resource Management Plan (CLCRMP) may result in the designation of protection areas and the delineation of special management zones. However, the plan has not yet been approved by government and until such time, it is impossible to fully assess its impact.

Forest Renewal BC funds a number of intensive silviculture activities that have the potential to affect timber supply, particularly in the long term. As with all components of an AAC determination, like the chief forester, I require sound evidence before accounting for the effects of intensive silviculture on possible harvest levels. Nonetheless, I will consider information on the types and extent of planned and implemented practices as well as relevant scientific, empirical and analytical evidence on the likely magnitude and timing of any timber supply effects of intensive silviculture.

Some have suggested that, given the large uncertainties present with respect to much of the data in AAC determinations, any adjustments in AAC should wait until better data are available. I agree that some data are not complete but this will always be true where information is constantly evolving and management issues are changing. Moreover, in the past, waiting for improved data created the extensive delays that resulted in the urgency to redetermine many outdated AACs in the province between 1992 and 1996. In any case, the data and models available today are improved from those available in the past, and will undoubtedly provide for more reliable determinations.

Others have suggested that, in view of data uncertainties, the chief forester should immediately reduce some AACs in the interest of caution. However, any AAC determination made by the chief forester or myself must be the result of applying our individual judgement to the available information, taking any uncertainties into account. Given the large impacts that AAC determinations can have on communities, no responsible AAC determination can be made solely on the basis of a response to uncertainty. Nevertheless, in making my determination, I may need to make allowances for risks that arise because of uncertainty.

With respect to First Nations' issues, I am aware of the Crown's legal obligations resulting from recent court decisions including those in the Supreme Court of Canada. The AAC that I determine should not in any way be construed as limiting those obligations under these decisions, and in this respect it should be noted that my determination does not prescribe a particular plan of harvesting activity within TFL 45.

With respect to future treaty decisions, as with other land-use decisions it would be inappropriate for me to attempt to speculate on the impacts on timber supply that will result from decisions that have not yet been taken by government.

Overall, in making this AAC determination, as the deputy chief forester, I am mindful of the mandate of the Ministry of Forests as set out in Section 4 of the *Ministry of Forests Act*, and of the chief forester's responsibilities under the *Forest Practices Code of British Columbia Act* and the *Forest Act*.

The Role of the Base Case

In considering the factors required under Section 8 of the *Forest Act* to be addressed in AAC determinations, I am assisted by timber supply forecasts provided to me through the work of the Timber Supply Review program for TSAs and TFLs.

For each AAC determination for a TFL, a timber supply analysis is carried out by the licensee using an information package including data and information from three categories—land base inventory, timber growth and yield, and management practices. Using this set of data and a computer model, a series of timber supply forecasts is produced, reflecting different starting harvest levels, rates of change over time, and potential trade-offs between short- and long-term harvest levels.

From this range of forecasts, one is chosen which attempts to avoid excessive changes from decade to decade and significant timber shortages in the future, while ensuring the long-term productivity of forest lands. This is known as the 'base case' forecast, and forms the basis for comparison when assessing the effects of uncertainty on timber supply.

Because it represents only one in a number of theoretical forecasts, and because it incorporates information about which there may be some uncertainty, the base case forecast for a TFL is not an AAC recommendation. Rather, it is one possible forecast of timber supply, whose validity—as with all the other forecasts provided—depends on the validity of the data and assumptions incorporated into the computer simulation used to generate it. In some cases, an AAC is determined that coincides with the base case starting harvest level. In other cases, an AAC is determined which differs significantly from the initial level modelled.

Therefore, much of what follows in the considerations outlined below is an examination of the degree to which all the assumptions made in generating the base case forecast are realistic and current, and the degree to which its predictions of timber supply must be adjusted, if necessary, to more properly reflect the current situation.

These adjustments are made on the basis of informed judgement, using current available information about forest management, which may have changed since the original information package was assembled. Forest management data are particularly subject to change during periods of legislative or regulatory change, such as the enactment of the Forest Practices Code, or during the implementation of new policies, procedures, guidelines or plans.

Thus it is important to remember, in reviewing the considerations which lead to the AAC determination, that while the timber supply analysis with which I am provided is integral to those considerations, the AAC determination itself is not a calculation but a synthesis of judgement and analysis in which numerous risks and uncertainties are weighed. Depending upon the outcome of these considerations, the AAC determined may or may not coincide with the base case forecast. Judgements that may be based in part on uncertain information are essentially qualitative in nature and, as such, are subject to an element of risk. Consequently, once an AAC has been determined, no additional

precision or validation may be gained by attempting a computer analysis of the combined considerations to confirm the exact AAC determined.

Timber Supply Analysis

The timber supply analysis for TFL 45 was conducted by Timberline Forest Inventory Consultants Ltd. (Timberline) under the direction of licensee staff. J.S. Thrower and Associates compiled the growth and yield information for the analysis. Timberline used its proprietary timber supply model Critical Analysis by Simulation of Harvesting Version 6.2g (CASH 6) to prepare harvest forecasts for the timber supply analysis. This model can be used to project spatially-implicit or spatially-explicit timber supply forecasts. Spatially explicit in this case means that the model accounts for the spatial relationship between mapped cutblocks, while spatially implicit means that the model does not track cutblocks (i.e., it does not track the spatial relationship between cutblocks); rather it approximates the timber supply impacts of implementing spatial restrictions using forest cover constraints.

For this analysis, the licensee used CASH 6 in a spatially-implicit mode for timber supply analysis and the spatially-explicit mode to develop the associated twenty-year plan. Based on a review by BCFS staff, as well as my previous experience reviewing the results of this model, I am satisfied that the spatially-implicit version of CASH 6 is capable of providing a reasonable projection of timber supply.

The base case provided in the timber supply analysis was intended to reflect current management practices. It projected an initial harvest level of 220 000 cubic metres per year, a level that is the same as the current AAC. The initial harvest level was maintained in the base case for three decades, decreasing by 8 percent in each of the following two decades to 186 200 cubic metres per year, and then rising after five decades to a long-term harvest level of 210 000 cubic metres per year. My considerations of the appropriateness of the assumptions used in the base case are discussed throughout this document.

In the timber supply analysis, various sensitivity analyses were conducted to assess the potential implications for timber supply arising from uncertainty in data assumptions and estimates. These analyses have also assisted me in considering the factors leading to my determination.

As discussed and quantified throughout this rationale, and in consideration of the items described above, I am satisfied that the information presented to me provides an adequate basis from which I can assess the timber supply for TFL 45 for this determination.

Consideration of Factors as Required by Section 8 of the *Forest Act*

Section 8 (8)

In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

i) the composition of the forest and its expected rate of growth on the area,

Land base contributing to timber harvesting

- general comments

As part of the process used to define the timber harvesting land base in the timber supply analysis, a series of deductions are made from the productive forest land base. These deductions account for the factors that effectively reduce the suitability or availability of the productive forest area for harvest, for ecological, economic or social (e.g. parks) reasons. For TFL 45 these reductions result in a long-term timber harvesting land base of 25 878 hectares, or approximately 40 percent of the productive forest land.

I have considered all of the deductions applied in the derivation of the timber harvesting land base.

In this document I will not discuss deductions with which I completely agree, namely those for non-productive and non-forest areas and non-commercial brush.

The other deductions are described below.

- economic and physical operability

The portions of a forest management unit that are not physically accessible for harvesting, or that are not expected to be feasible to harvest economically, are categorized as inoperable and are excluded when deriving the timber harvesting land base.

To identify inoperable areas for the purposes of the analysis, the licensee used the operability assessment for TFL 45 that was completed in 1994 and approved by the BCFS in 1995. In 2000, following map conversion from North American Datum (NAD) 27 to the Terrain Resource Inventory Mapping (TRIM) NAD 83 base, some minor adjustments were made to the operability maps to ensure operability classes were correctly identified. District staff have reviewed the mapping and are satisfied that it reflects current conditions.

Four operability categories are included in the current operability mapping: conventional, helicopter, marginal stands, and inoperable. Areas identified as being harvestable using conventional and helicopter harvesting systems were included in the timber harvesting land base for the base case, while marginal stands and inoperable areas were excluded. The excluded area amounted to 29 006 hectares after other previous reductions.

Marginally economic stands (with timber volume averaging 350 to 450 cubic metres per hectare) cover 1352 hectares of productive forest. Including these areas in the timber

harvesting land base would increase its area by about 5 percent. According to the sensitivity analysis provided by the licensee, if these stands were to contribute to timber supply, the initial harvest level could be maintained for five decades—two more than in the base case—and the long-term harvest level would increase by approximately 2 percent. According to the licensee, performance information by operability classification will be incorporated into Management Plan No. 4.

Although Interfor recently updated the operability classification and mapping, the new information (Harvest System / Access Classification project) was not available on time for the timber supply analysis underlying this determination.

I accept that the operability mapping as of 2000 was the best available information and is suitable for use in this determination. However, based on the sensitivity analysis related to marginal stands, I note that these stands could significantly increase the mid-term timber supply, depending upon logging economics at the time. If in time the licensee finds that these stands are indeed economic for harvesting, this can be accounted for in a future determination.

For the next timber supply analysis, I request that the information package include performance information by operability class to support the operability assumptions.

- roads, trails and landings

In the timber supply analysis, a percentage of the productive forest was excluded from the timber harvesting land base to account for the losses resulting from the construction of roads, trails and landings. Separate estimates were made for existing and for future roads, trails and landings, to reflect both current access and anticipated road requirements over time.

1) existing roads, trails and landings

Existing roads for the TFL are in the licensee's Geographic Information System (GIS) database as line features. They were classified by road type based on the licensee's familiarity with the TFL, rather than according to actual road width measurements. The licensee assumed a degraded road width of 12 metres for mainline roads. For branch roads, the degraded road width was estimated based on measurements of built road on the TFL, as surveyed in 1996/97. Application of these width estimates to the road lengths identified in the GIS database resulted in 842 hectares of productive forest land being excluded from the timber harvesting land base.

After the analysis, it was determined that the actual length of mainline road amounted to 29.5 km, not 9.7 km as reported in the information package—19.8 km were originally assumed to be 'branch road'. Therefore the disturbed area was underestimated by 4 hectares.

Although trails are constructed on the TFL for hoechucking and use of a mobile backspar, the soil on these trails is not excavated. Therefore, the licensee assumed no degradation associated with their construction and use. Landings may be necessary on the TFL for landing helicopter wood and some conventional yarding situations. According to the

licensee, current legislation encourages operators to limit the size of newly developed helicopter and conventional landings and other disturbances such as rock quarries and spoil sites. Therefore it assumed no additional reduction for these areas was necessary.

District staff have accepted the methodology and exclusions applied to account for site productivity lost to existing road development. I have also accept the deductions for existing roads, trails and landings as the best available information, noting that the small error made in the estimate of the length of mainline roads has an insignificant effect on timber supply.

2) future roads, trails and landings

To account for *future* roads, trails, landings, quarries and spoil sites, the licensee reduced the area of each harvested unit (currently older than age 40 years) by five percent the first time it was harvested in the model. This percentage was based on a review of silviculture prescriptions and some field verification of a sample of cutblocks logged over the past three years. The total deduction for future roads was 1015 hectares.

District staff have reviewed the methodology and exclusions applied to account for site productivity lost to future road development. Although they have no substantive information to confirm it, they believe that six percent for future roads is more representative of operational conditions in the Campbell River portion of the TFL.

I have reviewed the information regarding the accounting for future roads, trails and landings and note that the licensee and district staff disagree on the percentage of the area that will become roads to access future cutblocks. Using the district staff's estimate of six percent would not affect the short-term timber supply attained in the base case. However, because changes in the estimate for future roads will affect projections of long-term timber supply, I encourage the licensee to review this factor with district staff to reduce this uncertainty for the next determination.

- environmentally sensitive areas

An environmentally sensitive area (ESA) is an area identified during a forest inventory as particularly sensitive to disturbance and/or is significantly valuable for resources other than timber. ESA information was originally used to identify areas to exclude in deriving the timber harvesting land base where more specific or detailed information was not available about a particular forest resource. As improved non-timber resource inventories are being conducted and becoming available, the older ESA inventory is gradually being replaced.

In the analysis Interfor used "management zones" to delineate areas where non-timber resources are considered to need protection (i.e., including both the newer inventories and ESAs). Management zones were identified for slope stability and avalanche potential, recreation, and wildlife. In the base case, 3068 hectares were removed from the productive forest land base when deriving the timber harvesting land base. I will discuss my consideration of specific sensitive site categories later in the section entitled *Integrated resource management objectives*.

- deciduous (broadleaf) forest types

According to the licensee, except where hardwood stands are the most ecologically suitable species for a site, they will be converted to coniferous plantations where economically and ecologically justifiable. Hardwood species may be promoted where needed for site rehabilitation, to maintain slope stability, or to maintain or improve wildlife or riparian values.

As early as 1995, Interfor, in conjunction with Coast Mountain Hardwoods Inc., reviewed the operability of the deciduous stands on TFL 45. Candidate stands were identified through a map review, and were selected upon meeting a minimum age criterion (25 years) and species composition (red alder leading or secondary). Potential harvesting opportunities were identified across the TFL, in particular near Fanny Bay and at the head of Knight Inlet.

In April of 1998, with the assistance of Coast Mountain Hardwoods Inc., Interfor harvested a 20-hectare block of approximately 4500 cubic metres of red alder at the head of Knight Inlet. The stand was reforested to a mix of black cottonwood, western redcedar, Sitka spruce, and Douglas-fir.

Although Interfor intends to pursue further harvest of deciduous trees, it made no commitments in Management Plan No. 4 for an annual harvest of deciduous. Therefore, after the other deductions noted above, in the base case 1043 hectares of deciduous-leading stands were excluded from the timber harvesting land base. Of this, 883 hectares are dominated by red alder. For stands with a minor component of deciduous tree species, only the conifer volume was assumed to contribute to timber supply.

District staff confirm that currently no harvesting of deciduous tree species is taking place in TFL 45 and therefore the exclusion of deciduous stands from the timber harvesting land base reflects current practice.

For this determination, I accept the assumptions applied in the base case regarding management of deciduous species. However, I note that harvesting of deciduous species on TFL 45 could somewhat mitigate the mid-term timber supply deficit projected in the base case. I therefore encourage the licensee to consider harvesting deciduous species when market conditions are favourable. If the utilization of deciduous species increases significantly in the future, this can be accounted for in a subsequent determination.

- sites with low timber productivity

In deriving the timber harvesting land base, areas of low productivity because of inherent site factors such as nutrient availability, exposure, excessive moisture, or that are not fully occupied by commercial tree species, are deducted from the productive forest land base.

In the timber supply analysis, the licensee defined low productivity sites using recently completed terrestrial ecosystem mapping. Map polygons dominated by extremely dry, steep and wet site series were excluded from the timber harvesting land base. The net area for these site series totalled 831 hectares. To confirm that these site series were indeed avoided when harvesting, the licensee conducted a review of 2079 hectares of

harvested area which showed that only 16 hectares of the site series used to define low productivity sites were harvested.

I have reviewed the criteria used, and discussed the information with district staff. I accept that the method used is reasonable and the exclusions applied in the analysis reflect current performance on TFL 45. I accept that the best available information was used, and make no adjustments on account of this factor.

Existing forest inventory

In 2000 Interfor completed Phase 1 of a Vegetation Resources Inventory (VRI) for TFL 45, consisting of photo interpreted attributes. This inventory has been updated for harvesting, road construction, reforestation, silvicultural treatments and TFL area amendments to the year 2000. In addition, growth was projected to the year 2000.

According to MSRM staff, the photo-interpretation phase of TFL 45 has undergone appropriate quality assurance (QA). According to the licensee, the ground sample inventory (Phase 2 of the VRI) was partially completed in the summer of 2001 and will be completed in 2002, subject to funding.

Interfor conducted an assessment of its VRI inventory as described in an April 2001 report entitled *TFL 45 Inventory Audit and Statistical Adjustment*. In this evaluation, the licensee used inventory plots from the old inventory to provide estimates of volume for the new VRI inventory. According to the report, the VRI Phase 1 results may be underestimating the average volume per hectare for the timber harvesting land base by about six percent. However, MSRM staff reviewed the assessment and concluded that the distribution of the old ground samples is suspect and therefore the study conclusions may not truly represent the timber harvesting land base.

I note that in the base case the licensee assumed the lower, unadjusted volumes per hectare and that a sensitivity analysis showed that increasing the volumes by six percent extended the initial harvest level by one decade. I anticipate that Phase 2 of the VRI will be completed well before the next AAC determination, and the results will be incorporated at that time. Until then, I am satisfied that the available Phase 1 VRI inventory is the best available information and forms an acceptable basis for this determination. I encourage the licensee to complete the Phase 2 inventory, as planned, so it is available for the next timber supply analysis.

I have discussed with Forest Service staff and considered the information regarding the existing age class structure of the forest and the species composition of the timber harvesting land base. Based on my review, I accept the assumptions applied in the base case regarding these factors, and on these accounts I make no adjustments for this determination.

Expected rate of growth

In this document I will not discuss the factors associated with the expected growth rate of the forest for which I accept the modelling assumptions applied in the base case. These factors include the procedures used to aggregate stands into analysis units, the sequencing of harvest applied (the oldest first rule), and the application of operational adjustment

factors (OAFs) to managed stand volume estimates to account for conditions such as less than ideal tree distribution, small non-productive areas, endemic pests and diseases, or age dependent factors such as decay, waste and breakage.

Where I believe a factor warrants discussion, it is described below.

- site productivity

Inventory data include estimates of site productivity for each stand, expressed in terms of a site index. The site index is based on the stand's height as a function of its age. The productivity of a site largely determines how quickly trees grow. This in turn affects the time seedlings will take to reach green-up conditions, the volume of timber that can be produced, and the ages at which a stand will satisfy mature forest cover requirements and reach a merchantable size.

In general, in British Columbia, site indices determined from younger stands (i.e., less than 30 years old), and older stands (i.e., over 140 years old) may not accurately reflect potential site productivity. In young stands, growth often depends as much on recent weather, stocking density and competition from other vegetation, as it does on site quality. In old stands, which have not been subject to management of stocking density, the trees used to measure site productivity may have grown under intense competition or may have been damaged, and therefore may not reflect the true growing potential of the site. This has been verified in several areas of the province where studies—such as the old-growth site index (OGSI) project—suggest that actual site indices may be higher than those indicated by existing provincial inventory data from old growth forests. Studies include those known as 'paired-plot'—where plot samples from an old-growth stand and the adjacent second growth stand are compared—and a provincial veteran tree study. It has been consistently concluded from such studies that site productivity has generally been underestimated; managed forest stands tend to grow faster than projected by inventory-based site index estimates from old-growth stands.

For the purpose of this analysis, the licensee obtained site index values from the VRI inventory database and estimates based on the Site Index – Biogeoclimatic Ecosystem Classification (SIBEC) system.

VRI data include estimates of site index for each forest stand, and these were used for determining the volume of existing stands older than 40 years (see section entitled *Volume estimates for existing stands*).

Terrestrial ecosystem mapping (TEM), in combination with SIBEC relationships, were used to provide initial estimates of site index for future regenerated stands. The estimates were then field-sampled and adjusted (i.e., in a Site Index Adjustment project, documented in *Potential Site Index Estimates for the Main Commercial Species on TFL 45*). These 'potential site index' values were assigned to existing stands younger than 41 years and to all stands older than 40 years once harvested for the first time.

The TEM mapping has been accepted by Vancouver region staff and the assignment of site indices for all polygons in the base case has been accepted by Research Branch staff.

The licensee did not complete a sensitivity analysis with site index explicitly varied. Instead, it provided an estimate (based on a review of the yield tables) of the impact on timber supply of a 3-metre reduction in site index by reducing yield by 20 percent and increasing greenup age by 1 year. Long-term timber supply was reduced by approximately 16 percent. There was no impact on short- and mid-term timber supply.

The site indices used in the analysis for TFL 45 are based on very recent TEM-SIBEC analysis and ground sampling to adjust the site index estimates. In conjunction with the VRI, I conclude that this provides a solid basis for site index inputs to the modelling and that the data used by the licensee are the best available.

- estimates for existing natural stand volumes

Current and projected volumes of existing stands greater than 40 years of age were estimated using VRI attributes (species composition, site index, stocking class, and crown closure) and the Variable Density Yield Prediction model (version 6.6d of Batch VDYP—developed by the BCFS Resources Inventory Branch). Once an area was harvested for the first time in the analysis, the licensee projected its future growth and yield using estimates according to managed stand yield tables. Minor deciduous species components of the stands were excluded from contributing to the yield projections.

Stands currently less than 41 years of age were considered managed and their yields were projected according to managed stand yield tables (see *estimates for regenerated stand volumes*).

The existing stand yield tables were reviewed and accepted by MSRM in July 2001 as appropriate for use in the analysis. District staff indicate that they have no specific concerns about the volumes estimated for existing stands on the TFL.

I have reviewed the information regarding the volume estimates for existing stands. I am satisfied that acceptable procedures were followed in the analysis, and that the projected yields reflect current stand conditions on TFL 45. I therefore accept the information as suitable for use in this determination.

- estimates for regenerated stand volumes

In the analysis, the licensee used the Table Interpolation Program for Stand Yields (TIPSY) to estimate volumes for managed stands, defined for TFL 45 as all existing stands 40 years of age or less, and all stands regenerated in the future. These stands were assigned the potential site index from the site index adjustment project (discussed above under '*site productivity*') for projecting yields in TIPSY. The TIPSY-based volumes of regenerated Douglas-fir-leading stands were increased by 1 percent to account for the use of select seed in the planting program.

The managed stand yield tables were reviewed and accepted by Research Branch staff for use in the analysis.

I have reviewed the information regarding the assumptions for managed stands in the analysis. I am satisfied that the volume estimates were reasonably projected, and that the estimates are suitable for use in this determination.

- minimum merchantability standards

In timber supply analysis, estimates are made of the earliest age at which a stand has reached a harvestable condition or has met minimum merchantability criteria. The assumptions largely affect when second growth stands will be available for harvest in the model. In practice, many stands will be harvested later than the age at which they reach minimum merchantability, due to economic considerations and constraints on harvesting that arise from managing for other forest values such as visual quality, wildlife and water quality.

In the TFL 45 timber supply analysis, minimum harvestable ages were established based on the age at which annual growth was within 0.05 cubic metres per hectare per year of its culmination of mean annual increment (CMAI). At this point, a stand is at or very close to the age at which its average annual growth is at its greatest.

The licensee provided a sensitivity analysis to show the impact on timber supply of adjusting the minimum harvestable ages by plus and minus 10 years. In the base case, timber supply is significantly constrained by the availability of second growth timber in decades 5, 16 and 23. If the minimum harvestable ages were increased by 10 years, the base case harvest level would decline one decade earlier; if decreased by 10 years, there would be a slight long-term increase in timber supply.

I have reviewed the criteria and methodology used by the licensee and am not aware of any significant issues regarding the minimum harvestable age assumptions used in the base case. For this determination, I accept the minimum harvestable ages as modelled, and make no adjustments on this account.

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

Expected time for the forest to be re-established following harvest

- regeneration delay

Regeneration delay is the period between harvesting and the time at which an area becomes occupied by a specified minimum number of acceptable, well-spaced seedlings. In timber supply analysis, regeneration delay is used to determine the starting point of tree growth for projecting stand volumes.

Interfor used an area-weighted regeneration delay for each silviculture management regime assumed in the timber supply analysis. The regeneration delay ranged from 1 to 6 years depending on the site series and whether the regeneration is planted or natural.

The licensee provided a sensitivity analysis to show the impact on timber supply of increasing and decreasing the regeneration delay by one year. Increasing the delay by one year would cause the initial harvest level to decline one decade earlier than in the base case projection; decreasing the delay by one year would allow the initial harvest level to be continued for a decade longer.

District staff have reviewed the regeneration delays and indicate that they reflect current practice. I accept that the regeneration delays, as modelled, are the best available information and reflect current practice.

- not-satisfactorily-restocked areas

Not-satisfactorily-restocked (NSR) areas are areas of productive forest land where timber has been removed, either by harvesting or by natural causes, and a stand of suitable tree species and stocking has yet to become established. Where a suitable stand has not been regenerated and the site was harvested prior to 1987, the area is classified as 'backlog' NSR. All other NSR is considered 'current'.

Only three hectares are classified as backlog NSR on TFL 45; there are 325 hectares of current NSR. In the base case, all NSR is added back into the timber harvesting land base in the first decade of the simulation, as it is assumed that this area will regenerate within 2 years. According to the licensee, regeneration is accomplished as soon as possible following harvest and completion of any necessary site preparation treatment. The majority of the harvested area is planted within one year of completion of harvest.

District staff find the stated amount of NSR to be reasonable, and confirm that the assumed regeneration schedule reflects current practice. I have reviewed the information regarding not-satisfactorily-restocked areas, and am satisfied that NSR is properly accounted for in the base case.

- impediments to prompt regeneration

Regenerating stands may be influenced by factors that impede regeneration and reduce early stand growth. These factors should be accounted for when projecting stand yields over time.

In the 1996 AAC determination, the chief forester noted Interfor's statement that "...regional standards for the density of trees in regenerating stands ("stocking standards") will not be adhered to on colluvial sites, sites with a high water table, sites with shallow organic soils over rock, and sites where lower stand densities are used to meet wildlife management objectives."

The chief forester also noted that these areas with lower stocking standards were not modelled in the Management Plan No. 3 timber supply analysis, and encouraged the licensee to investigate this matter further so that it could be taken into account in future determinations.

In November 2000, the licensee completed a review of regeneration stocking levels of all blocks under silviculture prescription on TFL 45. This review was based on information in the licensee's Phoenix database as it is used to report the Major License Silviculture Information System (MLSIS) information to the BCFS. This database provides a block-specific record of all past and planned future silviculture activities, and was current for activities on TFL 45 to mid-September 2000. All results were summarized according to biogeoclimatic ecosystem classification to the site series level. In all cases in the resultant block list, reduced stocking levels were attributed to site conditions and not wildlife objectives. This analysis confirmed that past performance on these sites was the

best available measure of future occurrence. The results of this review are modelled in the timber supply analysis through the yield curves, with each site series being assigned two or more silvicultural regimes. The proportion of a site series where normal stocking cannot be achieved (shallow soils over rock, colluvial sites, etc., as noted above) was assigned a reduced stocking level in the model.

The reduced stocking levels were reviewed and accepted by district staff. I am satisfied that assumptions in the base case now reflect the reduced stocking levels on the areas in question and accept the regeneration regimes as modelled.

(iii) silviculture treatments to be applied to the area,

Silvicultural treatments to be applied

In this document I will not discuss the factors associated with silviculture treatments for which I accept the modelling assumptions applied in the base case. These factors are associated with incremental silviculture, in particular, the lack of fertilization treatments in new second-growth stands, and the use of juvenile spacing in some stands.

Where I believe a factor warrants discussion, it is described below.

- regeneration

The licensee has designed silviculture regimes based on ecosystem classification, regeneration type (planted or natural), species selection, and stand density objectives. These regimes reflect the management strategies used in the past forty years and assumed to be used in the future. Future regimes incorporate volume gain expected to arise through the planting of genetically improved growing stock. The aim of the silviculture program is to produce logs of a size, quality and species mix that will meet the demands of Interfor's sawmills.

Modelled stand densities range from 330 to 8800 stems per hectare. Site series that are planted and have natural ingress at free-growing are separated into two regimes to model the planted portion separately from the natural ingress. Juvenile spacing to 1000 stems per hectare was assumed for some stands and for some site series for future regenerated stands.

District staff agree that the regeneration assumptions applied in the base case adequately reflect current performance and experience. I have reviewed the regeneration assumptions and accept that they reflect current practice and are suitable for use in this determination.

- use of select seed

The Forest Practices Code requires the use of seed and vegetative material of the best genetic quality available for regeneration. Select seed produced from seed orchards is the product of B.C.'s forest gene resource management program, which uses traditional tree breeding techniques to select naturally-occurring, well-adapted, healthy and vigorous trees.

Select seed (class A) produces trees that grow faster than trees that germinated from natural stands for a specific time, which varies by species and site. As a result, a stand that originates from select seed has a greater volume at the same age than a natural stand with the same species composition. Current expectations are that the volume differences will begin to decrease beyond a certain stand age.

The licensee plans to plant Class A Douglas-fir seed in 13 percent of future stands. The expected overall volume gain from this seed is estimated to be 1 percent for Douglas-fir leading stands.

Based on information on the use of select seed, it appears that the 1 percent genetic gain modelled in the base case is low. According to Research Branch, genetic gain for Douglas-fir from new seed orchards can be in the range of 12-15 percent. In addition, the genetic gain for western hemlock is increasing. Although hemlock comprises a significant component of regenerating seedlings on TFL 45, no genetic gain for western hemlock was assumed in the base case, as this species is usually regenerated naturally.

Although the use of select seed is modelled in the base case, it appears likely that the use of improved seed will increase and volume gains associated with the use of this seed are improving. As a result, I conclude that long-term timber supply is underestimated by an unquantified amount and I have considered this below in *Reasons for Decision.*

- silvicultural systems

Until recently, the dominant silvicultural system on TFL 45 has been clearcutting with reserves. However, in Management Plan No. 4 Interfor commits to using alternative silvicultural systems to meet management objectives for visual quality, wildlife habitat or terrain stability, as well as to increase operability in environmentally sensitive areas, riparian buffers, wildlife management zones, and visually sensitive areas. Although the licensee indicates that these alternatives may include variable retention, group selection, seed tree, and shelterwood systems, it indicated that variable retention will be the main system and it is therefore the one modelled in the base case. Interfor plans to use variable retention silvicultural systems to maintain structural diversity. This is a result of extensive research indicating that structural complexity is important to ecosystem functioning and maintenance of biodiversity in coastal ecosystems.

For the term of Management Plan No. 4, variable retention silviculture will be applied to about 50 percent of the timber harvesting land base. In the base case the licensee assumed that 6 percent of the area harvested would be retained with forest cover and of this amount, 50 percent would satisfy wildlife tree requirements. The resulting 3 percent reduction was combined with the reductions required for Wildlife Tree Patches (WTP—see section discussing *Stand-level biodiversity*). Overall, a volume reduction of 8 percent (5 percent for WTP + 3 percent for variable retention) was applied to all yield curves to account for the combined effects of retaining trees under the variable retention silvicultural system and wildlife tree patches.

According to the licensee, experience on the TFL shows that variable retention can be successfully implemented to meet wildlife tree retention objectives. To date, this experience demonstrates that due to the spatial constraints inherent in the definition and

intention of variable retention, some retention patches must be located in operable and merchantable timber that is not otherwise constrained for riparian, visual, wildlife, or soils reasons. Efforts are made to minimize the amount of timber unduly constrained by variable retention.

In reviewing the variable retention yield reductions, Research Branch staff noted that no yield table reductions to account for shading were applied and estimate that the impact on yield could be in the order of 5 percent. The licensee acknowledges that there may be yield impact from shading, but it will take time to assess this. At present, the impact is difficult to estimate.

District staff confirm that the licensee is moving to variable retention silvicultural systems based on recent cutblocks submitted for approval in the Port McNeill Forest District. They also indicate that the modelled volume reductions seem reasonable based on recent harvesting.

I have considered the information on silvicultural systems and conclude that to the extent that the licensee adopts variable retention silvicultural systems, as is evident in the most recent approved cutblocks in the Port McNeill Forest District, shading and competition will lower the growth rate of regeneration relative to the TIPSY volume projections. Although the impact on growth rates is currently unknown, I have accounted for an associated mid- and long-term reduction in timber supply of up to 5 percent and have discussed this under *Reasons for Decision.*

Perhaps more significant, though, is the uncertainty around the precise area and forest cover that will remain following variable retention silviculture. I expect both the licensee and ministry staff to track the application of variable retention over the next few years in order to quantify this impact in time for the next timber supply analysis, and to provide information on the efficacy of this silvicultural system.

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

Timber harvesting

One factor associated with timber harvesting for which I accept the assumptions applied in the base case is the estimates of decay, waste and breakage. The other factor, which I believe warrants discussion in this document, is described below.

- utilization standards and compliance

Utilization standards define the species, dimensions and quality of trees that must be harvested and removed from an area during harvesting operations. In the base case the licensee assumed standard BCFS coastal utilization standards for existing unmanaged and managed stands.

For existing unmanaged stands, utilization standards used in the analysis include a minimum 17.5-centimetre diameter at breast height (dbh), a maximum 30-centimetre stump height, and a minimum 15-centimetre top diameter inside bark (dib).

For managed stands, utilization standards assumed in the analysis include a minimum 12.5-centimetre dbh with a maximum 30-centimetre stump height and a minimum 10-centimetre top dib. Although regional standards specify a 15-centimetre top dib, the yield difference between this and the 10-centimetre minimum modelled in the timber supply analysis is known to be negligible.

The application of utilization standards in the timber supply analysis was approved by MSRM and Research Branch staff. District staff confirm that current utilization practices in the TFL reflect these standards, and I am satisfied that the base case appropriately accounted for this factor.

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production,

Integrated resource management objectives

The Ministry of Forests is required under the *Ministry of Forests Act* to manage, protect and conserve the forest and range resources of the Crown and to plan the use of these resources so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realisation of fisheries, wildlife, water, outdoor recreation and other natural resource values are co-ordinated and integrated. Accordingly, the extent to which integrated resource management (IRM) objectives for various forest resources and values affect timber supply must be considered in AAC determinations.

To manage for resources such as water quality and aesthetics, current harvesting practices limit the size and shape of cutblocks and maximum disturbances (areas covered by stands of less than a specified height) and typically prescribe minimum green-up heights required for regeneration on harvested areas before adjacent areas may be harvested. Green-up requirements provide for a distribution of harvested areas and retention of forest cover in a variety of age classes across the landscape.

Interfor has implemented an "Environmental Management System" in order to govern, monitor, and improve their coastal environmental performance. In order to pursue various certification initiatives, it also completed a Sustainable Forest Management Plan. At this time, it has secured certification under the Environmental Standard ISO 14001 and the Sustainable Forest Initiative of the American Forest and Paper Association. It is now pursuing Forest Stewardship Council (FSC) certification concurrently with the on-going development of FSC standards in Canada.

In Management Plan No. 4, Interfor commits to adhere to its Environmental Management System and Sustainable Forestry Management plans. According to Interfor, the base case assumptions were consistent with this commitment.

In the analysis, several overlapping management zones were identified to reflect the various constraints on the land base for slope stability, wildlife, recreation and other resource values. These are discussed in the following sections.

The factors associated with integrated resource management objectives for which I accept the assumptions applied in the base case, are those concerning watershed considerations, karst features and cutblock adjacency.

Where I believe a factor associated with integrated resource management objectives warrants detailed discussion, it is described below.

- non-timber resource inventories

Most of the non-timber resource inventories for TFL 45 were revised or completed in 2000. Although many of these are approved, some are pending approval by the BCFS region or district, or the Ministry of Sustainable Resource Management. Some of these inventories were used to develop the data assumptions in the base case as further discussed below under the appropriate sections.

- recreation

In 2000 Interfor completed a recreation features inventory to 1998 Resources Inventory Committee standards. Interfor also prepared a Recreation Analysis and Management Strategy (RAMS) report in 1994 which was updated in October 2000 to the January 4, 1999 standards as provided by the Vancouver Forest Region.

Depending on the significance of the recreation features and their sensitivity, various land base reduction percentages were applied in the base case. These factors were approved by BCFS staff. Fifty percent of areas identified as being moderately significant or sensitive were excluded from the timber harvesting land base. Seven percent of areas identified as containing karst features were also excluded.

In total, 354 hectares of area identified as having recreation concerns were excluded from the timber harvesting land base after other land base reductions.

Although the recreation inventory has not received final approval, district staff did not identify any concerns during their review of the land base reductions applied for recreation. Based on their initial review, they do not anticipate any problems with the inventory.

Having reviewed the information regarding recreation resources, I am satisfied that these resource values were appropriately considered in the analysis and that the assumptions used are suitable for this determination.

- slope stability

To account for areas where the terrain is identified as being unstable (Es1) or potentially unstable (Es2), the licensee updated the 1993 mapping of Environmentally Sensitive Areas (ESA). Some areas not covered in the 1993 inventory were classified and the boundaries of some of the ESA areas were adjusted to more accurately delineate the areas with slope stability concerns.

When conducting spatially implicit timber supply analysis, the normal practice is to exclude only a portion of the timber harvesting land base identified as Es2. However, the licensee used the spatially explicit function of the timber supply model CASH6 to prepare

the twenty-year plan. The licensee therefore found it necessary to delineate the unstable areas within the areas broadly classified as Es2. This was accomplished by re-evaluating all the areas identified as Es2 and refining the boundaries so that the newly mapped Es2 units could be classified as entirely harvestable or entirely not harvestable.

For the analysis, all of the area identified as Es1 (1550 hectares) and of newly mapped Es2 polygons (389 hectares) was excluded from the timber harvesting land base. The regional geomorphologist from the Vancouver Forest Region reviewed the procedures and accepted them.

I have reviewed the accounting in the base case for areas with slope stability concerns and accept that it was based on the best available information and is suitable for use in this determination.

- archaeological sites

Cultural heritage resources generally include archaeological and traditional use sites. Archaeological sites contain physical evidence of past human activity, whereas traditional use sites may not necessarily contain historical physical evidence but may indicate current use by a First Nation. To help manage for unrecorded archaeological sites, archaeological overview mapping may be conducted to assign high, moderate or low ratings for archaeological potential within an area.

Although an archaeological overview assessment and a traditional use study have been conducted on the Port McNeill Forest District portion of the TFL, no heritage resource/archaeological sites are known to exist where harvesting activities might impact them. These inventories have not been conducted on the Campbell River District portion of the TFL and archaeological sites have not been identified in this area by any other means. No accounting for cultural heritage resources was included in the timber supply analysis.

I have reviewed the information regarding cultural heritage resources and I am satisfied that the base case has appropriately reflected the currently available information and in this regard is suitable for use in this determination.

- wildlife considerations

TFL 45 provides habitat for a number of wildlife species, including grizzly bear, black bear, black-tailed deer, mountain goat, and numerous small mammals, bird, amphibian and fish species. The biodiversity and riparian provisions of the Forest Practices Code are intended to provide for the needs of most wildlife species, however, some species require special management practices. In consideration of the habitat requirements for these species, areas may be set aside from harvesting or a suitable distribution of forest cover may be maintained over time.

According to the licensee, all available maps delineating wildlife areas were used to identify wildlife habitat. Grizzly bear (*Ursus arctos*) and ungulate (mountain goat, *Oreamnos americanus*; black-tailed deer, *Odocoileus hemionus*) winter and summer ranges are located within the TFL boundary.

1) grizzly bear habitat

Twelve grizzly bear management zones have been identified on TFL 45. Of these, the licensee excluded from the timber harvesting land base 330 hectares of grizzly bear ranges (summer and winter) in estuaries of the Franklin, Klinaklini, Sim and Kwalate rivers. Within the remaining areas, the licensee assumed that the general forest cover disturbance constraints within each Resource Emphasis Area, coupled with old-growth seral stage distribution requirements applied within each landscape unit, would address grizzly bear habitat requirements.

As part of the CCLCRMP, former MELP staff initiated an extensive field study of some identified areas of high importance for grizzly bears. Portions of TFL 45 are included within the scope of this study, the results of which may become available during the term of Management Plan No. 4.

For this determination, I note that no formal establishment of grizzly bear management or habitat areas has occurred through a higher level plan. I expect that the process leading to the establishment of a higher level plan for the area will assist in confirming the habitat needs of grizzly bears on TFL 45. For the present, I accept that the analysis assumptions used in the base case regarding grizzly bear habitat represent current practice. I am satisfied that the assumptions are appropriate and reflect the best available information for this determination. I expect that habitat concerns will be fully recognized in operational planning, and that more certain data will be available for the next AAC determination.

2) ungulate winter range

Mountain goat, black-tailed deer, and a small population of moose reside within TFL 45. There are 50 mountain goat and 12 black-tailed deer winter ranges in the TFL. No moose winter ranges have yet been identified. According to Ministry of Water Land and Air protection (MWLAP) staff, some areas adjacent to the Klinaklini River are likely needed for moose winter range, but the precise location and management regimes are still being developed. In the meantime, it is known that within the Klinaklini drainage, grizzly bear management zones are used by moose as winter range.

According to the licensee, the inventory and analysis of winter ranges within the TFL were completed in conjunction with former MELP staff. Using available maps, the licensee tracked all winter ranges within the TFL over time, and linework for the 1999 winter ranges was checked for border modifications resulting from mapping adjustments. Also, to ensure winter range guidelines are maintained, the ranges were evaluated for habitat suitability and ranked for future field verification.

According to the licensee, former MELP staff were consulted and they have approved modifications and associated land base reductions or forest cover constraints applied for the winter ranges.

In the analysis some Ungulate Winter Range (UWR) was entirely excluded from the timber harvesting land base. The total area excluded was 1939 hectares with 678 hectares being removed after other reductions.

The management of the remaining UWR was modelled using seral stage forest cover requirements, such that no more than 20 percent of the area could be covered with stands less than 20 years of age, and 20 percent of the area was required to be covered with stands greater than age 101 years at any point in time. This UWR zone covers a total of 4667 hectares of which 3214 hectares are located in the productive forest area and 230 hectares in the timber harvesting land base.

The licensee provided a sensitivity analysis showing the impact on timber supply of increasing and decreasing the allowable disturbance within the UWR zone to 25 percent and 15 percent respectively. Increasing the allowable disturbance had no impact on timber supply, while decreasing it allowed the initial harvest level to be maintained for only two decades rather than three decades as attained in the base case.

No ungulate winter ranges have been designated under the Forest Practices Code on TFL 45. Ungulate winter range areas are expected to be finalised and established under the Operational Planning Regulation provisions by October 2003. Until then, BCFS and MWLAP staff indicated that the UWRs assumed in the base case reasonably represent the UWRs that will eventually be designated.

I have reviewed the UWR assumptions used in the base case. I recognise that while the area that will eventually be excluded from the timber harvesting land base is uncertain, the UWR areas assumed in the base case have been recognised for some time and the associated management strategies are current practice. Any changes resulting from the final designation of UWRs under the Operational Planning Regulation can be accounted for in a future analysis. For this determination, I am satisfied that the assumptions in the base case reflect the best available information, and make no adjustments in this regard.

- identified wildlife

For wildlife species considered to be at risk, the Conservation Data Centre of British Columbia maintains forest district tracking lists. Each list names the species and plant associations considered to be at risk (e.g., endangered, threatened, vulnerable or sensitive) and which are known to occur, strongly expected to occur, or which have occurred in the past within a given forest district.

Identified wildlife refers to species at risk (red- and blue-listed) as well as regionally significant species that are potentially affected by forest management activities and that may not have been adequately accounted for through existing management strategies. While the biodiversity and riparian provisions of the Forest Practices Code are intended to provide for the needs of most wildlife species, some species that are considered to be "at risk" require special management practices. The Province's *Identified Wildlife Management Strategy* (IWMS)—released in February 1999—provides mechanisms for managing critical habitat for identified wildlife species including Wildlife Habitat Areas (WHAs), General Wildlife Measures (GWMs) and higher level plan recommendations.

Volume I of the Identified Wildlife Management Strategy (IWMS), released in February 1999, details several species that occur or potentially occur within TFL 45 and that may require future consideration. These include the tailed frog, northern goshawk, marbled

murrelet, Keen's long-eared myotis, fisher, grizzly bear and mountain goat. Volume II, which has yet to be released, may identify additional species.

According to district staff, identified wildlife likely to be found in TFL 45 are marbled murrelet, grizzly bear, and mountain goat. Some provisions included in the base case for grizzly bear and mountain goat were discussed above under *grizzly bear habitat* and *ungulate winter range*. Although many identified wildlife species will be managed through the establishment of WHAs and implementation of GWMs, some will be managed through practices specified in higher level plans. Species such as grizzly bear (and fisher, if found in TFL) are in the latter category. The CCLCRMP is the higher level planning process ongoing in the area that includes the TFL. According to the licensee, once the CCLCRMP process is completed, identified wildlife will be managed according to the higher level plans identified in the CCLCRMP process and those outlined in the *Managing Identified Wildlife: Procedures and Measures*.

I note that because specific WHAs or management strategies for identified wildlife species have yet to be established on the TFL, the licensee did not apply any constraints to account for IWMS provisions in the base case. However, as noted above, some consideration for grizzly bear and mountain goat were modelled. Although the impact of managing for other identified wildlife species is unknown at this time, I expect that the implementation of the IWMS will lead to a very small downward influence on mid- and long-term timber supply of less than 1 percent. I will discuss my considerations of this further under *Reasons for Decision*.

For this determination, it is not possible to specify the exact location or precise amount of habitat area that will be required within the timber harvesting land base to implement the IWMS. As the Province implements its strategy for the management of species at risk, I expect the specific implications to be reflected in future timber supply analyses for the TFL area, and these will be taken into account in future AAC determinations.

- riparian habitat

Riparian habitats occur along streams and around lakes and wetlands. The Forest Practices Code requires the establishment of riparian reserve zones (RRZs) that exclude timber harvesting, and riparian management zones (RMZs) that restrict timber harvesting in order to protect riparian and aquatic habitats. For each stream, lake or wetland, the RRZ and RMZ make up the entire riparian management area. Stream riparian classes are described in the *Riparian Management Area Guidebook* and are determined based on presence of fish, occurrence in a community watershed, and average channel-width criteria. The stream class is used to estimate the area required to be retained in the RRZ and the area or volume to be retained in the RMZ. Similar criteria are used to classify lakes and wetlands and estimate reserve zone and management zone retention.

Stream classification for the TFL was completed in 1999 using a TRIM-based gradient analysis and information from operational plans. Streams were classified as S1 large, S1, S2, S3-S4, or S5-S6. According to the licensee, the stream buffers were determined based on the most restrictive stream classification in a grouping. Therefore, in the base case, buffer widths exceed the legislated requirements on many of the streams. However,

according to the licensee, accounting for stream buffers using the most restrictive stream classification probably accounts indirectly for unmapped streams.

In total, 1217 hectares were excluded in the derivation of the timber harvesting land base to account for the RRZs, and 1544 hectares to account for management practices in the RMZs.

Lakes were classified according to the *Riparian Management Area Guidebook (1995).* For lakes, reserves totalled 4 hectares, but due to overlap with other reductions, only 1 hectare was removed from the timber harvesting land base.

District staff reviewed the criteria and deductions applied and point out that in practice the licensee harvests all the timber in RMZs. The licensee concurs that currently very few trees are retained in RMZs. However, it indicates that the trend will likely be to retain more trees in the future. It intends to monitor retention in the RMZs and to reflect actual practices in the next timber supply analysis.

I have reviewed the information regarding riparian considerations and am concerned that a significant portion of the riparian management zone has been excluded from the timber harvesting land base when current practice is to harvest all the timber in the RMZs within a cutblock. This area amounts to about six percent of the timber harvesting land base. Taking guidance from the sensitivity analysis in which the impact on timber supply of increasing the timber harvesting land base by ten percent was investigated, I find that on this account timber supply was probably underestimated by approximately four percent over the forecast period and I will discuss this further under *Reasons for Decision.*

I also find it uncertain if using the most restrictive stream classification to assign stream buffers will account for any buffers that may be required on unmapped streams. Nevertheless, at this time I accept this assumption as the best available information. I expect that over time, the licensee will improve the stream mapping and classification .

- fisheries sensitive zone

In addition to the riparian reserves indicated above, a 50-metre riparian reserve was applied to all streams in a portion of the Klinaklini Wetland area adjacent to the Klinaklini River. This wetland area is classified as a Fisheries Sensitive Zone. According to the licensee, the area also provides habitat for moose, bear and fish.

A total of 1480 hectares is included within the Fisheries Sensitive Zone. Most of this, 1296 hectares, overlaps with areas excluded for other reasons, including a minor area of riparian reserve. Thirteen small areas totalling 184 hectares were considered available for harvesting and were assumed to contribute to the timber harvesting land base.

District staff indicate that the modelling assumptions are consistent with current practices.

I am aware that no requirement or guideline exists to say that a 50-metre reserve zone should be maintained along streams within a fisheries sensitive zone. Nevertheless, I find that the application of the reserve likely does account for management constraints within areas subject to extreme fisheries sensitivity, although the extent to which this reserve accounts for the constraints is uncertain. For this determination I am satisfied that the assumptions applied in the base case are reasonable and reflect current practice.

I encourage the licensee to review the practices within the fisheries sensitive zone and to develop assumptions that reflect these practices for the next determination.

- visual quality considerations

Careful management of scenic areas visible from communities, public use areas, and travel corridors is an important forest management objective. The Forest Practices Code enables the management of visual resources by providing for scenic areas to be identified and made known, and by providing for the establishment of visual quality objectives (VQOs) that guide the management practices on a scenic area. To achieve this, visual landscape inventories are carried out to identify, classify, and record visually sensitive areas. On completion of such an inventory, a specialist may derive recommended visual quality objectives (RVQOs) of preservation, retention, partial retention, modification or maximum modification to identify levels of alteration that would be appropriate for particular areas. Visually sensitive areas can be identified by the district manager or in a higher level plan, and can be made known to licensees. The district manager or a higher level plan may also establish VQOs or recommended visual quality classes (RVQCs) to manage and conserve the visual resources in the scenic areas.

To manage for visual quality, constraints are placed on timber harvesting, road building, and other forest practices. The constraints, which are based on experience, research findings, and public preferences, are expressed in terms of forest cover requirements that relate to the maximum percentage of a viewshed that may be harvested at any one time, and to 'visually effective green-up' (VEG)—the stage at which a stand of reforested timber is perceived by the public to be satisfactorily greened-up from a visual standpoint.

Scenic areas were identified and made known by the district manager for the Port McNeill Forest District on January 14, 1999. In the base case the licensee accounted for these known scenic areas. For the TFL area within Campbell River Forest District, in the base case the licensee accounted for the visually sensitive areas identified in the landscape inventory approved by Vancouver Forest Region in 1995. These areas were made known by the district manager on October 2, 2001. In total, approximately 21 percent of the timber harvesting land base was assumed to be in visually sensitive areas.

Forest cover requirements were applied in the model limiting the amount of area within each visually sensitive zone that could be covered with stands that were less than the assumed VEG height of 5 metres. In accordance with the VQO buyback strategy, the licensee assumed that the allowable alteration would be the maximum in the range for each VQO as detailed in the *Procedures for Factoring Visual Resources into Timber Supply Analyses* (i.e., 5 percent in the retention zone, 15 percent in the partial retention zone and 25 percent in the modification zone). Interfor performed a sensitivity analysis to assess the impact on timber supply of applying the minimum in the range of allowable alteration percentages for each VQO class. In this analysis the harvest level was reduced by 10 percent compared to the base case over the forecast period.

In December 2000, the licensee completed a new Visual Landscape Inventory (VLI) in which approximately 34 percent of the timber harvesting land base was classified as visually sensitive. Although this inventory was not completed in time to be incorporated

in the base case, the licensee provided a sensitivity analysis showing the impact on timber supply of using the new information. At the same time, using procedures described in the *Procedures for Factoring Visual Resources into Timber Supply Analyses*, the licensee used slope information to determine the visually effective green-up height. On average, this resulted in an increase of 2 metres over the heights assumed in the base case.

The licensee provided two harvest flow options for this sensitivity analysis, both of which showed no impact in the first two decades and relatively small impacts in the mid term. Over the long term, timber supply was reduced by 3 to 5 percent. According to the licensee, these impacts were primarily attributable to the increased green-up height assumed in the sensitivity analysis.

The licensee also provided a forecast showing the impact on timber supply of applying only the CCLCRMP Special Management Zones (SMZ) VQO assumptions. In this case the area assumed to be visually sensitive only covered 4354 hectares (16 percent) of the timber harvesting land base. In this sensitivity analysis the short- and mid-term harvest levels attained in the base case were maintained and long-term timber supply was reduced by 1 percent.

Having reviewed the information regarding visually sensitive areas, I am mindful that the assumptions applied in the base case are based on visually sensitive areas made known by the district managers. I am also aware that the currently known visually sensitive areas may be changed pending review and consideration by the district managers of the new landscape inventory and as a result of higher level plan objectives that may be established under the CCLCRMP. In this regard I note that the sensitivity analyses provided indicate that no impact on timber supply in the short term is likely to result if either of these changes are implemented. For this determination I am satisfied that the assumptions applied in the base case reflect current practice and I find that on this account the base case provides a reasonable projection of timber supply.

- landscape-level biodiversity

Biodiversity is defined as the full range of living organisms, in all their forms and levels of organization, and includes the diversity of genes, species and ecosystems and the evolutionary and functional processes that link them. Under the Forest Practices Code, biodiversity in a given management unit is assessed and managed at both the landscape and stand levels.

Achieving landscape-level biodiversity objectives involves maintaining forests with a variety of patch sizes, seral stages, and forest stand attributes and structures, across a variety of ecosystems and landscapes. A major consideration in managing for biodiversity at the landscape level is leaving sufficient and reasonably located patches of old-growth forests for species that are dependent on or are strongly associated with old-growth forests. Although some general forest management practices can broadly accommodate the needs of most ecosystems, more often a variety of practices is needed to represent the different natural disturbance patterns under which ecosystems have evolved.

The delineation and formal designation of 'landscape units' is a key component of a sub-regional biodiversity management strategy. A landscape unit is an area established

by the district manager, generally up to 100 000 hectares in size, based on topographic or geographic features such as a watershed, or series of watersheds, to manage biodiversity and other forest resource values.

The *Biodiversity Guidebook*, the *Landscape Unit Planning Guide* and *Higher Level Plans: Policy and Procedures* all provide policy and guidance on management for landscape-level biodiversity. The *Landscape Unit Planning Guide* provides guidance on which components of the full range of recommendations included in the *Biodiversity Guidebook* should be implemented to achieve a balance of forest management objectives. The *Landscape Unit Planning Guide* contains forest cover constraints for old seral forest that are recommended for application at the biogeoclimatic variant level within each landscape unit. The recommendations are stated as a minimum percentage of the productive forest to be retained in stands above a specified age that varies by ecosystem type. The guide also allows the old seral requirement to be phased in over time in landscape units with a lower biodiversity emphasis.

The 1996 *Higher Level Plans: Policy and Procedures* guide provides further policy guidance. It outlines three biodiversity emphasis options (BEOs)—lower, intermediate and higher—that may be employed when establishing biodiversity management objectives for a landscape unit. To achieve a balance between biodiversity and timber supply objectives, this guide recommends the application of a mix of BEOs in each subregional planning area. The proportions of a planning area subject to lower and intermediate biodiversity emphasis should range from 30 to 55 percent, with the average at approximately 45 percent of the area subject to lower, 45 percent to intermediate, and 10 percent to a higher BEO (45-45-10).

Portions of eleven "draft" landscape units are found in TFL 45. For the analysis the licensee assumed that all landscape level biodiversity requirements would be met entirely within the TFL boundaries.

Landscape units and biodiversity emphasis assignments are still in the draft stage in the area and are awaiting the recommendations of the CCLCRMP strategic planning process. The policy generally followed for timber supply analyses where landscape units and BEOs have not been established is to model the distribution of BEOs within each biogeoclimatic ecosystem variant in each landscape unit using a weighted average forest cover requirement, and this approach was taken in the base case for TFL 45. In addition, in accordance with the procedures described in the *Landscape Unit Planning Guide*, the licensee assumed that for the portion in the lower BEO the requirement for old seral forest could initially be reduced to one-third of the full requirement with the full requirement having to be recruited over three rotations (210 years).

Interfor provided sensitivity analyses to assess the impact on timber supply of increasing and decreasing the old seral requirements by 5 percent and applying the "mature plus old" seral stage requirement. None of these changes in assumptions required a change in the short-term timber supply; impacts in the mid- and long term were relatively small. The licensee also provided sensitivity analysis to assess the impact of using the draft BEOs from the Vancouver Forest Region Landscape Units map dated November 22, 1999 (*Regional Landscape Unit Planning Strategy*), and meeting the old seral requirement in

the low BEO landscape units over three rotations; and using the same draft BEOs but meeting all the seral requirements (early, and mature plus old), and the full old seral requirement in low BEO landscape units immediately.

Timber supply was slightly increased in the long term (about two percent) when the requirements from implementation of the draft BEOs were assumed. With the added requirement that the early and "mature plus old" seral requirements be met and full old seral requirement be met immediately, timber supply declined to the mid-term level starting in decade two.

I also note that there was an error in the analysis in that some variants were allowed to violate the biodiversity constraints during the forecast period. This error was shown to have no impact on short-term timber supply and only an insignificant long-term impact.

District staff have reviewed the assumptions in the analysis regarding landscape level biodiversity and confirm that they reasonably reflect the requirements guiding operational planning on TFL 45. They also indicated that it is unlikely that boundaries of the draft landscape units and the draft BEOs will be changed significantly when they are finally established.

I acknowledge that the process leading to the establishment of landscape units and BEOs has been ongoing for some time. Nevertheless, the draft landscape unit boundaries and BEOs may change when they are established. Having reviewed the information concerning landscape level biodiversity and in accordance with my guiding principles, I am satisfied that the assumptions applied in the base case reflect the best available information for this determination. Furthermore, as indicated by the sensitivity analysis, timber availability should not be significantly affected if the draft landscape units and BEOs are established during the term of this determination.

- *stand-level biodiversity*

Stand-level biodiversity is managed by retaining reserves of mature timber, or wildlife tree patches (WTPs), within cutblocks and in adjacent inoperable and other retained areas to provide structural diversity and wildlife habitat. The *Landscape Unit Planning Guide* outlines procedures and makes recommendations on the proportion of a cutblock that is required in wildlife tree retention.

In the base case the licensee used the wildlife tree retention percentages documented in Table A3.1 of the *Landscape Unit Planning Guide*. The overall retention requirement for WTPs equalled 5 percent. As described above under *silvicultural systems*, the licensee increased the WTP retention by 3 percent (to 8 percent) to account for trees retained for variable retention silviculture. To account for this in the model, the licensee reduced the average volume per hectare of harvested stands by 8 percent.

According to the licensee, accounting for WTPs in this way does not allow the WTPs to contribute to landscape level biodiversity requirements. In actuality, WTPs generally contribute to landscape level forest structure, and some contribute to old-growth targets. I note that timber supply was not sensitive in the short term to changes in assumptions concerning old seral forest retention. I am therefore satisfied that the licensee's concern is not germane to short-term timber supply.

District staff expressed no concerns with the methodology used. In summary, I am satisfied that the analysis assumptions appropriately reflect the best available information.

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

Other information

I have reviewed the other information related to the capability of the area to produce timber, including the licensee's twenty-year plan and harvest sequencing and have taken those into consideration in my determination.

- *Central Coast Land and Coastal Resource Management Plan*

All of TFL 45 lies within the area covered by the Central Coast Land and Coastal Resource Management Plan (CCLCRMP), now being formulated to guide the future management of British Columbia's Central Coast. The CCLCRMP is being developed co-operatively by First Nations, local residents, government, industry, labour and other special interest groups. The overall goal is to promote growth and economic development, while ensuring social and environmental needs are properly met.

In April 2001, the government announced its acceptance of the recommendations of the CCLCRMP. These recommendations relate to candidate protection areas, special management zones, and "option areas" on which land-use decisions remain to be taken.

No option areas were identified on TFL 45. However, the Port McNeill Forest District portion of TFL 45 (Knight Inlet) contains part of a candidate protection area (Kwalate Creek portion of the Ahnuhati Complex). It is also partially covered by a Special Management Zone (Visual) Priority 1. The Campbell River Forest District portion of TFL 45 includes areas within a Special Management Zone (Visual) Priority 2. The Estero Basin candidate protection area is immediately adjacent to a portion of TFL 45 and may include a small portion of the TFL when the boundaries are confirmed.

Candidate protection areas are considered to be prime candidates for future protection, some of which may also be subject to pre-treaty management measures. It is generally expected that final definition, designation and management planning for these areas will take into account the views of First Nations with respect to their cultural, economic and traditional uses in these areas.

Special Management Zones (SMZ) for visual quality are areas recognised for their high tourism values. The SMZs identify high priority visual areas and are intended to specifically address visual management issues related to forest development. The framework agreement for the CCLCRMP outlines a process for developing visual quality objectives and appropriate management practices for the SMZ areas. This process is expected to be completed over the next 12 to 24 months.

Because the CCLCRMP has not been established as a Higher Level Plan, and is therefore not yet conclusive, its tentative management recommendations were not reflected in the base case. However, the licensee used sensitivity analyses to evaluate the implications for timber supply of excluding the candidate protection areas from the timber harvesting land base. These areas cover approximately 800 ha (3 percent) of the current timber

harvesting land base and in the model their exclusion resulted in a 3 percent reduction in timber supply over the entire forecast period.

The licensee also provided sensitivity analyses to evaluate the implications for timber supply of excluding the candidate protection areas and managing the viewscapes in the special management zones. For this sensitivity analysis the licensee assumed that the visual quality classes from the new VLI would be applied within the SMZs. The licensee further assumed that no other areas on the TFL are visually sensitive. Managing for the SMZ visual quality objectives further reduced timber supply by approximately 1 percent in the mid- to long term when compared to the impacts of excluding the protection areas.

I have considered the information about the CCLCRMP recommendations, and the implications for timber supply on TFL 45. I note that government has not designated any protected areas, and that the management regimes that will eventually be applied in the SMZs are still being developed. As discussed in my guiding principles, it would be inappropriate for me to speculate on decisions that are yet to be made by government. The base case assumptions are intended to reflect current management on TFL 45 and on this account I find them suitable for use in this determination. However, if and when portions of the TFL area become protected areas under the law, or management objectives or constraints are established through a higher level plan order, I am prepared to review the AAC for TFL 45 earlier than in five years as required by legislation.

Similarly, if within the area of TFL 45 the Lieutenant Governor in Council should establish a "designated area" under Part 13 of the *Forest Act*, and if the Minister of Forests subsequently decides to prohibit harvesting on such a "designated area", I will consider imposing a temporary reduction in the AAC.

- ha[illegible]t distribution by forest district

District staff raised a concern that a disproportionate amount of harvesting is being conducted in the Campbell River Forest District area of TFL 45 compared to the harvest level in the Port McNeill Forest District area. From 1992 to 2000, 41 percent of the volume harvested came from the Campbell River district portion of TFL 45, whereas this area covers approximately 30 percent of the operable area of the TFL. District staff are concerned that harvesting in the Port McNeill area of the TFL is economically less attractive than harvesting in the Campbell River area. Therefore they suggested that I consider partitioning the AAC to encourage harvesting in each of the districts in proportion to the total productive capacity of the two areas.

In response to this concern, the licensee provided several sensitivity analyses. When harvesting in the model was distributed according to the operable land base of the two Districts (Port McNeill – 70 percent; Campbell River – 30 percent), the base case harvest level could not be attained after decade one and was reduced until the sixth decade after which base case harvest levels were attained. When the harvest priority was set to target the Port McNeill Forest District area first, timber supply was significantly reduced in the fifth decade and the long-term harvest level was reduced somewhat. According to the licensee, the short-term stability of the forecast reflects the amount of operable old-growth timber currently within the Port McNeill Forest District portion of the TFL, which

accounts for 61 percent of the total operable area. Beyond this, however, the base case harvest level was not attainable since insufficient harvestable volume was available in the Campbell River Forest District area to mitigate shortfalls in several future decades.

When the harvest priority was instead set to target the Campbell River Forest District area first, base case harvest levels were achievable throughout the forecast period because sufficient volume was available in the Port McNeill Forest District area when timber supply shortfalls occurred within the Campbell River Forest District area.

I have reviewed the information on harvesting trends between the two districts. I acknowledge the district staff concerns regarding the apparent concentration of the harvest in the Campbell River Forest District blocks. I am mindful, however, that most of those involved in forestry and logging activities on TFL 45 lives in Campbell River and few employees live in the Port McNeill area. I am also mindful that all the timber harvested on TFL 45 flows to mills outside of the area. Therefore community stability is not a significant factor affecting my decision on this account.

In addition, I find the sensitivity analysis where the harvest was targeted primarily to the Campbell River Forest District area compelling evidence that at least from a timber supply point of view, concentrating harvest in this area will not undermine the overall timber supply on TFL 45. To the contrary, it appears to be the best strategy for optimizing the available volume over time. Therefore I have decided that there is no need at this time to attribute portions of the AAC to each forest district.

Nevertheless, I recognize that disproportionately heavy harvesting in the Campbell River area in the short term might be cause for concern about longer term timber supply if the Port McNeill component of the TFL is significantly less attractive economically. Over the next five years I encourage the licensee to address this matter to inform the next timber supply review.

(b) the short and long-term implications to British Columbia of alternative rates of timber harvesting from the area,

Alternative rates of harvest

The nature of the transition from harvesting old growth forests to harvesting second growth forests is a major consideration in determining AACs in many parts of the province. In the short term, the presence of large timber volumes in older forests often permits harvesting above long-term levels without jeopardising future timber supply. In keeping with the objectives of good forest stewardship, AACs in British Columbia have been and continue to be determined to ensure that current and medium-term harvest levels will be compatible with a smooth transition toward the usually (but not always) lower long-term harvest level. Thus, timber supply should remain sufficiently stable so that there will be no inordinately adverse impacts on current or future generations. To achieve this, the AAC determined must not be so high as to cause later disruptive shortfalls in supply nor so low as to cause immediate social and economic impacts that are not required to maintain forest productivity and future harvest stability.

The licensee prepared one harvest flow alternative to the base case forecast by starting at 200 000 cubic metres per year, maintaining that harvest level for as long as possible, and

then raising it to the long-term harvest level. The initial level was attainable for ten decades and then the harvest could increase to about the base case harvest level for the remainder of the forecast period.

Community dependence on the forest industry

As discussed below, the timber harvested in TFL 45 significantly contributes to the fibre requirements of several mills in the Lower Mainland.

According to Management Plan No. 4, 275 people are directly employed by logging and milling operations related to timber harvesting on TFL 45, accounting for approximately 578 person years of indirect and/or induced employment per year. Most of the people employed in harvesting in TFL 45 live in Campbell River.

Having reviewed this information, I am aware that several communities benefit from employment opportunities provided by forest management activities from TFL 45. Consideration of the implications for these communities is an important factor in my determination of an AAC for TFL 45.

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

Timber processing facilities

Timber harvested from TFL 45 represents about 6 percent of the licensee's total current AAC of 3.6 million cubic metres. The volume harvested from the TFL is processed in a number of Interfor's sawmills on the Lower Mainland. Logs graded and sorted as pulp are sold or traded for sawlogs from other companies.

I am mindful of the reliance of timber processing facilities on the volume harvested in the TFL and have taken this into account in my determination.

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia,

Economic and social objectives

- Minister's letter and memorandum

The Minister has expressed the economic and social objectives of the Crown for the province in two documents to the chief forester—a letter dated July 28, 1994, (attached as Appendix 3) and a memorandum dated February 26, 1996, (attached as Appendix 4). These economic and social objectives are an important consideration in my determination of the AAC for TFL 45.

The letter and memorandum include objectives for forest stewardship, a stable timber supply, and a managed transition from old-growth to second-growth forests, in order to provide for community stability.

The Minister stated in his 1994 letter, that "any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability."

He placed particular emphasis on the importance of long-term community stability and the continued availability of good forest jobs. To this end he asked that the chief forester consider the potential impacts on timber supply of commercial thinning and harvesting in previously uneconomical areas. To encourage this the Minister suggested consideration of partitioned AACs.

The Minister's 1996 memorandum addressed the effects of visual resource management on timber supply. It asked that pre-Code constraints applied to timber supply in order to meet VQOs be re-examined when determining AACs in order to ensure they do not unnecessarily restrict timber supply.

I have considered the contents of the letter and memorandum in my determination of the AAC for TFL 45. I note that commercial thinning is not occurring to any significant extent on TFL 45, and that the licensee has not indicated any plans to undertake any commercial thinning in its proposed MP No. 4.

When discussing *economic and physical operability*, I noted that the possibility of harvesting on "marginally operable land" could add significantly to timber supply in the mid–term, depending upon logging economics at the time.

I have considered the contents of the letter and memorandum in my determination of an AAC for TFL 45.

- local objectives

The Minister's letter of July 28, 1994, suggests that the chief forester should consider important social and economic objectives that may be derived from the public input in the timber supply review where these are consistent with government's broader objectives.

The licensee indicates in its draft Management Plan No. 4 that it actively solicited input on the statement of management objectives, options and procedures (SMOOP) and the draft management plan. It received few public comments on its draft Management Plan No. 4 including its timber supply analysis information package. The licensee has responded to the comments.

I am satisfied that the licensee has carried out its public involvement obligations satisfactorily, and that no specific issues were identified in public review which would impact this determination.

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

Unsalvaged losses

Unsalvaged losses are timber volumes destroyed or damaged by agents such as fire, wind, insects and disease, that are not recovered through salvage operations. Numerous parasites, fungi or plants can kill trees or degrade the quality and value of logs.

Estimates for unsalvaged losses account for epidemic infestations that are not incorporated into yield estimates used in the analysis. Timber volume losses due to insects and diseases that normally affect stands (endemic losses) are accounted for in

inventory sampling for existing timber yield estimation or through other methods. Losses associated with second-growth stands are addressed by application of operational adjustment factors (OAFs) as noted previously in this rationale.

The licensee estimated non-recoverable losses for fire, insects, disease, and other natural factors.

For losses to fire, a review of fire history on the TFL was undertaken with the BCFS Quinsam Fire Base to determine the unsalvaged volume. A 10-year (1988 – 1997) fire history was obtained from the Protection Branch Fire Reporting System. Over the decade a total of 5 fires burned, totalling 5.4 hectares. Of this area, 0.4 hectares were burned because of lightning and therefore constituted unsalvaged losses averaging 0.04 hectares per year on the productive land base. In the analysis, this derived area was reduced by 59 percent to reflect the fact that 59 percent of the productive forest is outside the timber harvesting land base. Assuming an average stand volume of 572 cubic metres per hectare in the stands where these non-recoverable losses occur, the licensee estimated that approximately 10 cubic metres per year have been lost to fire on the timber harvesting land base.

Information regarding losses to insects, disease and other natural factors is very sparse. For the purposes of the analysis Interfor assumed that these losses are the same as the losses to fire. Thus the total yearly loss is 20 cubic metres per year.

District staff have reviewed the estimates for unsalvaged losses and consider them to be an inadequate reflection of actual losses experienced on coastal forests of this type. I also find the estimate used to be low compared to estimates used for other coastal units. I acknowledge that, as requested by the chief forester in the previous AAC rationale statement, the licensee did use a more rigorous approach in estimating losses than was used for the last analysis. However, based on estimates used for other coastal units, I find it unlikely that the current provision for non-recoverable losses is adequate. I request that the licensee review these estimates again for the next determination.

Although no better information is available at this time, relative to the base case I believe that actual losses will constitute a reduction in timber supply of an unknown amount over the forecast period. I will discuss this uncertainty further under *Reasons for Decision*.

Reasons for Decision

In determining an AAC for TFL 45, I have considered the information discussed throughout this document, and I have reasoned as follows.

For the reasons stated above in *Timber Supply Analysis* and from reviewing the considerations as recorded above, I accept that the licensee's base case forms an appropriate basis from which to assess timber supply for this AAC determination. I have identified factors which, considered separately, indicate that the timber supply may be either greater or less than that projected in the base case. Some of these factors can be quantified and their impacts assessed with some reliability. Others may influence timber supply by adding an element of risk or uncertainty to the decision but cannot be reliably

quantified at this time. I have accounted for these latter factors in my determination in more general terms.

In believe that two assumptions in the base case underestimate timber supply:

- *Use of select seed* –The use of select seed will likely increase on TFL 45 and the volume gains from the use of select seed are improving. I conclude that on this account timber supply has been underestimated by an unknown amount in the long term.
- *Riparian habitat* – I note that 1544 hectares (approximately 6 percent of the timber harvesting land base) was excluded from the timber harvesting land base on an assumption that timber will be retained in riparian management zones. In fact, current practice is to harvest all the trees in this zone within a given cutblock. I acknowledge that the licensee expects that in the future more trees will be left in the riparian management zone. However, until this practice is confirmed and retention percentages are quantified, I find that on this account timber supply has probably been underestimated in the base case by up to four percent over the forecast period.

I believe that three assumptions in the base case may overestimate timber supply:

- *Silvicultural systems* – To the extent that the licensee adopts variable retention silviculture, as is evident in the most recently approved cutblocks in the Port McNeill Forest District, I believe that shading and competition will reduce the growth rate of regenerating stands. Although no one has any data to quantify this impact, I believe it is reasonable to anticipate a reduction in the long term relative to the base case, in the order of 5-percent
- *Identified wildlife* – I expect that implementation of the identified wildlife management strategy will lead to a downward influence on mid- and long-term timber supply of perhaps 1 percent.
- *Unsalvaged losses* – I believe that the provision for unsalvaged losses assumed in the base case was inadequate, and that timber supply was overestimated in the base case by an unknown amount over the forecast period.

In making my determination I am also mindful of four factors that introduce uncertainty or risk to the decision:

- *Economic and physical operability* – Although I accept the exclusion of inoperable areas in the base case, I note that inclusion of 1352 hectares of "marginally operable" area would improve timber supply in the mid–term, depending upon logging economics at the time.
- *Visual quality considerations* – I note that there is uncertainty about the management of visual quality, particularly in respect to the new visual landscape inventory. Nevertheless, four alternatives of visual quality management were presented and all indicate no necessary impact on timber supply over the first two decades.
- *Central Coast Land and Coastal Resource Management Plan* – I note that the current version of this Plan proposes certain protection areas and SMZs for visual quality.

The protection areas have not been designated by government, and the management regimes that will eventually be applied in the SMZs are still being developed. If protection areas are formally designated by government within the area covered by TFL 45, or management objectives and constraints are established through a higher level plan order, I will assess at that time whether or not I need to review the AAC for TFL 45 earlier than in five years as required by legislation. I am also prepared to consider a temporary AAC reduction if and when any part of the TFL becomes a "designated area" and harvesting is prohibited under Part 13 of the *Forest Act*.

- *Silvicultural systems* – The licensee assumed that, as a result of applying the variable retention silvicultural system, the volume harvested would be reduced by 6 percent. Of this, 50 percent would satisfy wildlife tree objectives. As variable retention harvesting has just recently been initiated on the TFL, the appropriate volume reduction and the extent to which stems left for variable retention will overlap with wildlife tree patch requirements is currently unknown. I expect both the licensee and ministry staff to track the experience over the next few years in order to better estimate this impact for the next analysis.

Having considered the factors that cause uncertainty in the projected timber supply, none cause me significant concern in the short term. I believe that the short-term timber supply is stable for three decades, after which the harvest level may have to be slowly reduced. Changes relative to the base case in assumptions regarding economic and physical operability, visual quality considerations and silvicultural systems are unlikely to affect timber supply in the short term or to cause any significant disruptions in the medium- and long terms. Changes in timber supply resulting from the implementation of the recommendations of the CCLCRMP were also shown in the analysis not to affect timber supply significantly. Nevertheless, as I stated previously, if decisions are made by government concerning the recommendations of the CCLCRMP that may affect timber supply on TFL 45, I am prepared to review the AAC for TFL 45 earlier than in five years as required by legislation.

Determination

I have considered and reviewed all the factors documented above, including the uncertainties of the information provided and the resulting risks for timber supply. It is my determination that a timber harvest level that accommodates objectives for all forest resources during the next five years, that reflects current management practices as well as the socio-economic objectives of the Crown, can be best achieved on TFL 45 by establishing an AAC of 220 000 cubic metres. This AAC relates to the total land base, including Schedule A and B land, and will support harvesting by the licensee and by the Small Business Forest Enterprise Program.

This determination is effective November 1, 2001, and will remain in effect until a new AAC is determined, which must take place within five years of this determination.

If additional significant new information is made available to me, or major changes occur in the management assumptions upon which I have predicated this decision, then I am prepared to revisit this determination sooner than the five years required by legislation.

Implementation

In the period following this determination and leading to the subsequent determination, I encourage BCFS and licensee staff to undertake the tasks and studies noted below. I recognise that the ability to undertake these projects is dependent on the availability of staff time and funding. However, this work will be important to help reduce the risk and uncertainty associated with key factors that affect timber supply on TFL 45. I encourage the licensee to:

- complete ground sample inventory (Phase 2) of the Vegetation Resources Inventory well before the next timber supply analysis;
- with BCFS district staff, review the estimate for losses to future roads;
- continue to monitor the condition of deciduous stands on TFL 45 with a view to harvesting when market conditions are favourable;
- improve the stream mapping and classification, so that deductions from the timber harvesting land base can be better estimated;
- document harvesting and retention in riparian management zones to better inform future timber supply analyses;
- incorporate the new operability and visual landscape inventory mapping into the next analysis;
- provide performance information by operability class in the next information package; and
- in conjunction with BCFS district staff, track the actual retention of trees in the variable retention silvicultural system, and their impact on regeneration growth rates.

Ken Baker

Ken Baker
Deputy Chief Forester

October 31, 2001

Appendix 1: Section 8 of the *Forest Act*

Section 8 of the *Forest Act*, Revised Statutes of British Columbia 1996, reads as follows:

Allowable annual cut

8. (1) The chief forester must determine an allowable annual cut at least once every 5 years after the date of the last determination, for

(a) the Crown land in each timber supply area, excluding tree farm licence areas, community forest areas and woodlot licence areas, and

(b) each tree farm licence area.

(2) If the minister

(a) makes an order under section 7 (b) respecting a timber supply area, or

(b) amends or enters into a tree farm licence to accomplish the result set out under section 39 (1) (a) to (d),

the chief forester must make an allowable annual cut determination under subsection (1) for the timber supply area or tree farm licence area

(c) within 5 years after the order under paragraph (a) or the amendment or entering into under paragraph (b), and

(d) after the determination under paragraph (c), at least once every 5 years after the date of the last determination.

(3) If

(a) the allowable annual cut for the tree farm licence area is reduced under section 9 (3), and

(b) the chief forester subsequently determines, under subsection (1) of this section, the allowable annual cut for the tree farm licence area,

the chief forester must determine an allowable annual cut at least once every 5 years from the date the allowable annual cut under subsection (1) of this section is effective under section 9 (6).

(4) If the allowable annual cut for the tree farm licence area is reduced under section 9 (3), the chief forester is not required to make the determination under subsection (1) of this section at the times set out in subsection (1) or (2) (c) or (d), but must make that determination within one year after the chief forester determines that the holder is in compliance with section 9 (2).

(5) In determining an allowable annual cut under subsection (1) the chief forester may specify portions of the allowable annual cut attributable to

(a) different types of timber and terrain in different parts of Crown land within a timber supply area or tree farm licence area, and

(b) different types of timber and terrain in different parts of private land within a tree farm licence area.

(c) [Repealed 1999-10-1.]

(6) The regional manager or district manager must determine an allowable annual cut for each woodlot licence area, according to the licence.

(7) The regional manager or the regional manager's designate must determine a rate of timber harvesting for each community forest agreement area, in accordance with

(a) the community forest agreement, and

(b) any directions of the chief forester.

(8) In determining an allowable annual cut under subsection (1) the chief forester, despite anything to the contrary in an agreement listed in section 12, must consider

(a) the rate of timber production that may be sustained on the area, taking into account

(i) the composition of the forest and its expected rate of growth on the area,

(ii) the expected time that it will take the forest to become re-established on the area following denudation,

(iii) silviculture treatments to be applied to the area,

(iv) the standard of timber utilization and the allowance for decay, waste and breakage expected to be applied with respect to timber harvesting on the area,

(v) the constraints on the amount of timber produced from the area that reasonably can be expected by use of the area for purposes other than timber production, and

(vi) any other information that, in the chief forester's opinion, relates to the capability of the area to produce timber,

(b) the short and long term implications to British Columbia of alternative rates of timber harvesting from the area,

(c) the nature, production capabilities and timber requirements of established and proposed timber processing facilities,

(d) the economic and social objectives of the government, as expressed by the minister, for the area, for the general region and for British Columbia, and

(e) abnormal infestations in and devastations of, and major salvage programs planned for, timber on the area.

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Appendix 2: Section 4 of the *Ministry of Forests Act*

Section 4 of the *Ministry of Forests Act* (consolidated 1988) reads as follows:

Purposes and functions of ministry

4. The purposes and functions of the ministry are, under the direction of the minister, to

(a) encourage maximum productivity of the forest and range resources in British Columbia;

(b) manage, protect and conserve the forest and range resources of the government, having regard to the immediate and long term economic and social benefits they may confer on British Columbia;

(c) plan the use of the forest and range resources of the government, so that the production of timber and forage, the harvesting of timber, the grazing of livestock and the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are co-ordinated and integrated, in consultation and co-operation with other ministries and agencies of the government and with the private sector;

(d) encourage a vigorous, efficient and world competitive timber processing industry in British Columbia; and

(e) assert the financial interest of the government in its forest and range resources in a systematic and equitable manner.

Documents attached:

Appendix 3: Minister of Forests' letter of July 28, 1994

Appendix 4: Minister of Forests' memo of February 26, 1996

File: 10100-01

JUL 28 1994

John Cuthbert
Chief Forester
Ministry of Forests
595 Pandora Avenue
Victoria, British Columbia
V8W 3E7

Dear John Cuthbert:

Re: Economic and Social Objectives of the Crown

The *Forest Act* gives you the clear responsibility for determining Allowable Annual Cuts, decisions with far-reaching implications for the province's economy. The *Forest Act* provides that you consider the social and economic objectives of the Crown, as expressed by me, in making these determinations. The purpose of this letter is to provide this information to you.

The social and economic objectives expressed below should be considered in conjunction with environmental considerations as reflected in the Forest Practices Code, which requires recognition and better protection of non-timber values such as biodiversity, wildlife and water quality.

The government's general social and economic objectives for the forest sector are made clear in the goals of the Forest Renewal Program. In relation to the Allowable Annual Cut determinations you must make, I would emphasize the particular importance the government attaches to the continued availability of good forest jobs and to the long-term stability of communities that rely on forests.

Through the Forest Renewal Plan, the government is taking the steps necessary to facilitate the transition to more value-based management in the forest and the forest sector. We feel that adjustment costs should be minimized wherever possible, and to this end, any decreases in allowable cut at this time should be no larger than are necessary to avoid compromising long-run sustainability.

.../2

Province of British Columbia
Minister of Forests
Parliament Buildings
Victoria, British Columbia
V8V 1X4

In addition to the provincial perspective, you should also consider important local social and economic objectives that may be derived from the public input on the Timber Supply Review discussion papers where these are consistent with the government's broader objectives.

Finally, I would note that improving economic conditions may make it possible to harvest timber which has typically not been used in the past. For example, use of wood from commercial thinnings and previously uneconomic areas may assist in maintaining harvests without violating forest practices constraints. I urge you to consider all available vehicles, such as partitioned cuts, which could provide the forest industry with the opportunity and incentive to demonstrate their ability to utilize such timber resources.

Yours truly,

Andrew Petter
Minister

Province of British Columbia
OFFICE OF THE MINISTER

Ministry of Forests

MEMORANDUM

File: 16290-01

February 26, 1996

To: Larry Pedersen
Chief Forester

From: The Honourable Andrew Petter
Minister of Forests

Re: **The Crown's Economic And Social Objectives Regarding Visual Resources**

Further to my letter of July 29, 1994, to your predecessor, wherein I expressed the economic and social objectives of the Crown in accordance with Section 7 of the *Forest Act*, I would like to elaborate upon these objectives as they relate to visual resources.

British Columbia's scenic landscapes are a part of its heritage and a resource base underlying much of its tourism industry. They also provide timber supplies that are of significant economic and social importance to forest industry dependent communities.

Accordingly, one of the Crown's objectives is to ensure an appropriate balance within timber supply areas and tree farm licence areas between protecting visual resources and minimizing the impact of such protection measures on timber supplies.

As you know, I have directed that the policy on management of scenic landscapes should be modified in light of the beneficial effects of the Forest Practices Code. In general, the new policy should ensure that establishment and administration of visual quality objectives is less restrictive on timber harvesting. This change is possible because alternative harvesting approaches as well as overall improvement in forest practices will result in reduced detrimental impacts on visually sensitive areas. Also, I anticipate that the Forest Practices Code will lead to a greater public awareness that forest harvesting is being conducted in a responsible, environmentally sound manner, and therefore to a decreased public reaction to its visible effects on the landscape. In relation to the Allowable Annual Cuts determinations that you make, please consider the effects that the new policy will have in each Timber Supply Area and Tree Farm Licence.

.../2

In keeping with my earlier letter, I would re-emphasize the Crown's objectives to ensure community stability and minimize adjustment costs as the forest sector moves to more value-based management. I believe that the appropriate balance between timber and visual resources will be achieved if decisions are made consistent with the ministry's February 1996 report *The Forest Practices Code: Timber Supply Analysis*.

Finally, in my previous letter I had asked that local economic and social objectives be considered. Please ensure that local views on the balance between timber and visual resources are taken into account within the context of government's broader objectives.

Andrew Petter
Minister of Forests